

WHAT IS CLAIMED IS:

1 1. A substrate processing system comprising:
 2 a deposition chamber comprising a reaction zone;
 3 a substrate holder that positions a substrate in the reaction zone;
 4 said substrate holder comprising a first RF electrode;
 5 a gas distribution system includes a gas inlet manifold for supplying
 6 one or more process gases to said reaction zone;
 7 said gas inlet manifold comprising a second RF electrode;
 8 a plasma power source for forming a plasma within the reaction zone
 9 of said deposition chamber; and
 10 an impedance monitor electrically coupled to the deposition chamber to
 11 measure an impedance level of said plasma.

1 2. The substrate processing system of claim 1 wherein said
 2 substrate holder comprises a first RF electrode, and wherein said gas distribution
 3 system includes a gas inlet manifold that comprises a second RF electrode.

1 3. The substrate processing system of claim 1 further comprising
 2 a computer processor communicatively coupled to said impedance monitor so that
 3 said computer processor receives as an input the measured impedance level of said
 4 plasma.

1 4. The substrate processing system of claim 3 further comprising
 2 a variable capacitor electrically coupled to said chamber and controllably coupled to
 3 said processor wherein said processor adjusts a capacitance level of said variable
 4 capacitor to vary the impedance of said plasma in response to the measured
 5 impedance level of said plasma.

1 5. The substrate processing system of claim 3 further comprising
 2 a pressure control system configured to control a pressure level within said chamber

08988246-120197

3 and controllably coupled to said processor wherein said processor controls said
4 pressure control system to vary the pressure within the chamber in response to the
5 measured impedance level of said plasma.

1 6. The substrate processing system of claim 3 wherein said
2 processor controls said plasma power source to vary the power applied to the plasma
3 in response to the measured impedance level of said plasma.

1 7. A method for depositing a film on a substrate in a substrate
2 processing chamber, said method comprising the steps of:
3 introducing one or more process gases into a reaction zone of the
4 substrate processing chamber;
5 forming a plasma from said one or more process gases;
6 maintaining the reaction zone at deposition conditions suitable to
7 deposit a layer from said one or more process gases;
8 measuring an impedance level of said plasma; and
9 adjusting deposition conditions in the reaction zone in response to said
10 measured impedance level.

1 8. The method of claim 7 wherein the step of adjusting said
2 deposition conditions in the reaction zone comprises the step of adjusting the
3 impedance of plasma by adjusting a capacitance level of a variable capacitor
4 electrically coupled to the processing chamber.

1 9. The method of claim 7 wherein the step of adjusting said
2 deposition conditions in the reaction zone comprises the step of adjusting a pressure
3 level within the reaction zone.

1 10. The method of claim 7 wherein the step measuring an
2 impedance level of said plasma includes the step of inputting the measured level to a

0898246 120197

- Ad
AB

Add C3

Add 50